CS10  
The Beauty and Joy of Computing  
Lecture #11: Recursion II  

2011-03-02

Will Apple continue to thrill its users with outstanding technology amidst tons of competition from its Android Rivals? Will Steve Jobs make an appearance? Will you buy one?

How the Computer Works ... n!

- Factorial(n) = n!
  - Inductive definition:  
    - n! = 1, n = 0  
    - n! = n * (n-1), n > 0  
  - Let's act it out...  
    - "Little people", or "subcontractor" model  
      - 1!  
      - 2!  
      - 3!  
      - 4!  
      - 5!  

Counting Change (thanks to BH)

- Given coins {50, 25, 10, 5, 1} how many ways are there of making change?  
  - 5: 2 (N, 5 P)  
  - 10: 4 (D, 2N, N 5P, 10P)  
  - 15: 6 (DN, D5P, 3N, 2N5P, 1N10P, 15P)  
  - 100?

Call Tree for "Count Change 10 [10 5 1]"

- It's important to understand the machine model  
- Recursion is a very powerful idea, and one way to separate good from great

Summary